

EFFECTS OF PERCEIVED FETAL MOVEMENT  
and  
FETAL ULTRASOUND IMAGERY  
on  
MATERNAL-FETAL ATTACHMENT

A Thesis Presented to the  
Division of Nursing  
College of Pharmacy and Health Sciences  
Drake University

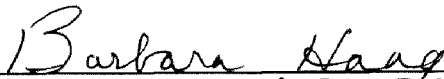
In Partial Fulfillment  
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by  
Darlene Shipp  
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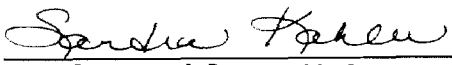
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Abstract of a Thesis by  
Darlene Shipp

The purpose of the study was to examine the effects of perceived fetal movement and/or viewing of the fetus by the pregnant woman via ultrasonography on maternal-fetal attachment. The 79 subjects were 16-39 years of age and in the first or second trimester of pregnancy. Subjects completed a Demographic Questionnaire and the Prenatal Maternal Attachment Scale (PMAS). Pregnant women who perceived fetal movement did not score significantly higher on the PMAS than pregnant women who had not perceived fetal movement. There was no significance difference in PMAS scores before and after pregnant women viewed their fetus via ultrasonography. Pregnant women who viewed their fetus via ultrasonography scored significantly higher on the PMAS than pregnant women who had not viewed their fetus via ultrasonography. Findings of the study contribute to the knowledge and practice of nursing inasmuch as nurses are in an optimal position, through client education and anticipatory interventions, to enhance the concept of maternal-fetal attachment. Recommendations for further research were made.

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## CHAPTER I

### BACKGROUND OF THE PROBLEM

Over the past 25 years, increasing attention has been paid to the relationship exhibited between a mother and her newborn infant. This relationship has interchangeably been referred to as bonding and attachment. Fostering the development of this relationship has become a central issue for modern obstetrical practice, both in medicine and in nursing. Many attachment theorists have assumed that the attachment between a mother and her newborn infant is a process with roots in the postpartum and early childhood periods (Bowlby, 1958; Klaus et al., 1972).

Although a qualitative change in the mother's relationship with her infant seems to take place during the postpartum and early childhood periods, theorists now postulate that these periods by no means constitute the beginning of that relationship. Rubin (1975) and Leifer (1977) have suggested that the quality of the relationship between mother and infant hinges, not only on the time immediately after birth and into early childhood, but also on the mother's relationship with her fetus. These authors also suggest that the mother



comes to terms with, and learns to love, her unborn child through certain developmental tasks during pregnancy. These developmental tasks of pregnancy include the mother's acceptance and emotional incorporation of the fetus, the development of an affective tie, and giving of herself (Rubin, 1975).

According to Rubin (1975), factors that contribute to the mother's identification with the fetus are a necessary prenatal requirement for the bonding or attachment process. This process may begin with the first sensation created by fetal movement and continue with other perceptions throughout pregnancy. Such experiences validate an awareness of another separate being for the mother. From this starting point, a mother increasingly demonstrates behaviors that signify the early stages of attachment. The degree of prenatal attachment appears to vary among gravidas, and greater attachment prenatally is associated with greater attachment postnatally. Therefore, an understanding of the process of prenatal attachment between mother and fetus is needed so that health care providers may take the necessary steps to promote early attachment.

### Purpose of Study

The purpose of this study was to examine the effects of perceived fetal movement and/or viewing of the fetus by the pregnant woman via ultrasonography on maternal-fetal attachment.

### Definitions of Terms

For the purpose of this study, the following key concepts were defined:

#### Maternal-fetal attachment

Maternal-fetal attachment is the extent to which pregnant women engage in behaviors that represent the development of an affiliation and interaction with their unborn children. Maternal-fetal attachment behaviors were defined according to the Prenatal Maternal Attachment Scale (PMAS) (LoBiondo-Wood, Vito, & Brage, 1989), described later in this paper. Examples of attachment behaviors include, but are not limited to, talking to the fetus, calling the fetus by a pet name, rubbing or massaging the pregnant abdomen, listening to soothing music, reading to the fetus, healthful hygienic practices, attention to better dietary habits, and compliance with prenatal care appointments and regimen.

### Perception of fetal movement

Perception of fetal movement is the report by the pregnant woman of physical sensations which indicate to her the presence of a viable fetus. The mother may report feeling a "fluttering" or "gas bubbles" sensation as first movements of the fetus, watching her tummy move corresponding to the changing of positions by the fetus, or palpations of baby parts (e.g., knee, foot, elbow) through her abdominal wall as the fetus kicks and/or moves.

### Ultrasonography

Ultrasonography is a diagnostic radiologic technique in which structures of the body are visualized by recording the reflections (echoes) of ultrasonic waves directed into body tissues. The echoes are then converted into electrical impulses that are displayed as a picture. In obstetrical practice the technique can facilitate attempts to evaluate fetal size, fetal maturity, and fetal/placental position, as well as provide additional diagnostic data. The mother may verbalize feelings experienced while visualizing identified fetal parts (e.g., head, extremities,

beating heart) during the procedure and may be given an actual photograph of the fetus to keep.

### Hypotheses

Three hypotheses were tested:

1. Pregnant women who have perceived fetal movement will score significantly higher on the Prenatal Maternal Attachment Scale (PMAS) than pregnant women who have not perceived fetal movement.
2. Pregnant women who have viewed their fetus via ultrasonography will score significantly higher on the Prenatal Maternal Attachment Scale (PMAS) than they did before viewing their fetus via ultrasonography.
3. Pregnant women who have viewed their fetus via ultrasonography will score significantly higher on the Prenatal Maternal Attachment Scale (PMAS) than pregnant women who have not viewed their fetus via ultrasonography.

Based on the results of research conducted by Leifer (1980) and Heidrich and Cranley (1989), perceived fetal movement was hypothesized to be a significant variable affecting changes in pregnant women's feelings of attachment. Kohn, Nelson, and Weiner (1980), Milne and Rich (1981), and Fletcher and

Evans (1983) have suggested that viewing of the fetus by the pregnant woman via ultrasonography is related to increased feelings of maternal-fetal attachment. Building on the results of their research, this study's hypotheses suggested that the variable of pregnant women viewing their fetus via ultrasonography would significantly affect maternal-fetal attachment in a positive direction.

#### Theoretical Basis of the Study

Three theories were used in the development of this study, Bowlby's attachment theory (1958), Rubin's theory of maternal behaviors in pregnancy (1975) and Roy's Adaptation Model of Nursing (1970). Each framework is briefly described below.

Bowlby defined attachment theory as a way of "conceptualizing the propensity of human beings to make strong affectional bonds to particular others" (1958, p. 352). Attachment behavior is described as any form of behavior that results in a person attaining or retaining proximity to some other differentiated and preferred individual.

Rubin's (1975) model described prenatal components of the bonding or attachment process that begins with

the first sensations of fetal presence, usually created by fetal movement. As stated earlier, these experiences validate for the mother an awareness of another separate being. From this point, mothers increasingly demonstrate behaviors that signify the early stages of prenatal attachment.

Two key concepts of Roy's Adaptation Model for Nursing were utilized to guide the framework for this study: role function and interdependence. They are utilized as they relate to adaptive behaviors of the pregnant woman toward her unborn child that may in turn impact in a positive way the outcome of this pregnancy and future mother-child relationship. Roy's Adaptation Model of Nursing as applied to the conceptual framework for this paper is further discussed in Chapter II.

Clinicians have suggested that ultrasound examinations during pregnancy are related to increased maternal-fetal attachment. These suggestions have been supported by researchers describing the effects of ultrasound as positive. In fact, studies indicate that ultrasound examinations have increased feelings of maternal-fetal attachment (Kohn, Nelson, & Weiner, 1980; Milne & Rich, 1981; Fletcher & Evans, 1983).

### Significance of The Study

This study represents a logical next step to previous research related to the effects of perceived fetal movement and viewing of her fetus by the pregnant woman via ultrasonography on maternal-fetal attachment. This study contributes to nursing's body of knowledge by clarifying the importance of interventions during pregnancy to further facilitate positive maternal health practices. Interventions which could help the pregnant woman strengthen her feelings of attachment to her fetus may subsequently hold implications for the successful outcome of the pregnancy, as well as strengthen the parenting role in the postpartum period and early childhood.

Nursing is in an optimal position to enhance the concept of maternal-fetal attachment through client education and anticipatory nursing intervention in critical areas. These areas include: positive health care measures, appropriate dietary habits for pregnancy, abstinence/avoidance of drugs and alcohol, compliance with prescribed prenatal visits and regimen of care. Nurses can also help mothers increase their

awareness of fetal growth and development, foster increased maternal awareness of fetal cues (e.g., time and frequency of movements), enhance mothers' prenatal preparation for baby care, identify clients at risk for parenting deficits, and provide appropriate guidance for clients at risk for parenting deficits.



## CHAPTER II

### LITERATURE REVIEW

The review of literature pertinent to this study is divided into four areas: Conceptual Framework, Maternal-Fetal Attachment, Fetal Movement, and Ultrasonography.

#### Conceptual Framework

The nursing conceptual framework utilized as a basis for this study was Roy's Adaptation Model (1970). The nurse using the Roy Adaptation Model views each individual as a whole, integrated being. Roy described the individual in terms of a holistic adaptive system affected by the world around (external stimuli) and within (internal stimuli) called the environment. Holistic pertains to the idea that the human system functions as a whole. Adaptive means that the human system has the capacity to adjust effectively to changes in the environment and in turn affects the environment.

The environment is more specifically known as stimuli: focal, contextual and residual. It is the pooling of these stimuli that creates the adaptive ability of the individual to cope with the changing

environment. Based on the environment and the current adaptive level, an individual makes a response which is termed either adaptive or ineffective (Roy & Andrews, 1991).

Roy has categorized the mechanism for coping as regulator and cognator subsystems. The regulator subsystem responds automatically through neural, chemical and endocrine coping processes. The cognator subsystem responds through four cognitive-emotive processes: perceptual/information processing, learning, judgment and emotion (Roy & Andrews, 1991).

Stimuli from the internal and external environment activate the regulator and cognator coping mechanisms which, in turn, produce behavioral responses. These responses were categorized by Roy into four adaptive modes: physiological, self-concept, role function and interdependence. These responses may be either adaptive (promoting the wholeness of the individual) or ineffective (not contributing to the integrity of the individual) (Roy & Andrews, 1991).

The physiological mode is associated with the way the person responds physically to stimuli from the environment. The coping mechanisms are associated with

physiological functioning and the subsequent responses are physiological behaviors (Roy & Andrews, 1991).

The self-concept mode focuses specifically on the psychological and spiritual aspects of the individual. This mode is viewed as having two components: the physical self including body sensation and body image and the personal self comprised of self-consistency, self-ideal and the moral-ethical-spiritual self. It is the composite of beliefs and feeling that an individual holds about him or herself at a given time (Roy & Andrews, 1991).

The role function mode focuses on the roles the individual occupies in society. Associated with each role are instrumental behaviors and expressive behaviors. The manner in which the individual fulfills these role expectations is an indication of role functioning (Roy & Andrews, 1991).

The interdependence mode focuses on interactions related to the giving and receiving of love, respect and value. The basic premise of this mode is termed affectional adequacy--the feeling of security in nurturing relationships. Two specific relationships are the focus of the interdependence mode: significant

others (persons who are most important to an individual) and support systems (others contributing to the meeting of needs) (Roy & Andrews, 1991).

According to the Roy Adaptation Model, nursing acts to promote the process of an individual's becoming a holistic and adaptive being. The goal of nursing is stated as the promotion of adaptation in each of the four modes, thus contributing to the individuals health and quality of life (Roy & Andrews, 1991).

Within the role-function mode, role is defined as a set of expectations about how an individual occupying a given position behaves toward an individual occupying another position (Roy & Andrews, 1991). Instrumental behaviors and expressive behaviors can readily be illustrated by the mothering role. Caring for the baby's physical needs involves instrumental behaviors while holding, cuddling and talking to the baby are expressive behaviors. With relation to maternal-fetal attachment, these positive role functions, both instrumental and expressive, may be enhanced during the prenatal period as a result of the mother's perception of fetal movement and/or viewing of the fetus via ultrasonography. Nursing has an optimal opportunity to

positively affect future mother-infant relationships by fostering appropriate role-function behaviors during the prenatal period.

The second concept of Roy's Adaptation Model for Nursing that was used to guide this study concerns the interdependence mode of adaptation. This mode, like the role-function mode, involves interaction with others. This mode, however, focuses on closer relationships than those implied in roles or positions in society. The interdependence mode is one in which affectional needs are met. According to the Roy Adaptation Model, each person strives for adequacy and mastery. Affectional adequacy is the feeling of security in nurturing relationships (Tedrow, 1991).

These relationships involve the willingness and ability to love, respect and value others and to accept and respond to love, respect and value given by others. The individual who has a comfortable balance of interdependence feels adequate and secure in relationships with other people. The individual feels loved and supported by others and can express love and support to other people (Tedrow, 1991).

Behaviors that demonstrate interdependence nurturing and affection are called receiving and giving behaviors. Indication of receiving behaviors are expressing love for another individual and expressing appreciation of thoughtful actions. Giving behaviors are those of giving or supplying nurturing to another individual. These behaviors may include caring for another, touching, providing physical and psychological support, and performing thoughtful gestures (Tedrow, 1991).

In the interdependence mode, the specific relationships of significant others and support systems are observed. A significant other is an individual to whom meaning or importance is given. It may be a parent, spouse, friend, family member, God or Supreme being. Support systems are persons or groups that contribute to meeting a person's interdependence needs. Support systems provide the same functions of giving and receiving love, respect and value; however, their meaning does not carry the same intensity as that of the relationship with a significant other (Tedrow, 1991).

As applied in this study, the receiving and giving behaviors may be demonstrated by the pregnant woman toward her unborn child by touching or massaging the pregnant abdomen, talking to or reading to the unborn child, and other identified prenatal attachment behaviors. In response, the fetus may move or quiet, thus evidencing acknowledgment of the mother's affectional relationship with this significant other. The health care system may be a support system with the nurse as a particular part of that support system. The nurse can maximize the importance of good dietary habits, healthful hygienic practices and compliance with prenatal regimens in congruence with the pregnant woman's response to perceived fetal movement and/or viewing of the fetus via ultrasonography.

#### Maternal-Fetal Attachment

A mother's attachment to her child forms the basis for her part in the socialization of that child. In the past two decades, particular attention has been given to identifying the origins of this attachment with the intention of facilitating its development. Although the earlier focus of attachment has been on

the first hours following birth (Klaus, et al., 1972), by no means does birth mark the beginning of the mother-child relationship.

Rubin (1975) described the development of a bond between mother and baby as one of the four tasks of pregnancy. The four tasks include: "(1) seeking safe passage for herself and her child through pregnancy, labor, and delivery; (2) insuring acceptance of the child she bears by significant persons in her family; (3) binding-in to her unborn child; and (4) learning to give of herself" (p. 144). Rubin further purported that, during the first months of pregnancy, the acceptance of the pregnancy is the focus. She theorized that the engaging way in which a mother looks at, explores, and cuddles her newborn is believed to be a consequence of pre-birth experiences that have prompted her to feel emotional proximity to her fetus.

Evidence suggested that attachment begins during pregnancy as a result of physiological and psychological events. For five months or more of her pregnancy, the mother experiences physical and intellectual awareness of the fetus/child (Cranley, 1981).



Leifer (1977) defined the development of maternal-fetal attachment as "the central crucial psychological task encountered by the pregnant woman" (p. 68). An exploratory study by Leifer conducted with 19 primiparas corroborated the prenatal attachment or "binding-in" process described by Rubin (1975). Leifer categorized behaviors that indicate a growing affectional tie for the fetus by trimesters. In the first trimester, the attachment behaviors include the mother's extended conversations about the child's future and consideration of the child's name. In the second trimester, the pregnant woman shows attachment behaviors by engaging in imaginary conversations with the baby in response to fetal movements. She may call the fetus by a pet name, read about child development, and begin prenatal classes. By the third trimester, her behaviors include more intense nesting behaviors, such as physical preparations for the baby and increased emotional investment in the fetus.

Carter-Jessop (1981) attempted to build upon these prenatal attachment inferences by developing strategies to promote intrauterine attachment. Carter-Jessop's study sample consisted of ten primiparas who were

between the thirty-second and thirty-seventh weeks of gestation and were all under the care of a private obstetrical practice. The subjects were assigned randomly to experimental and control groups. The control group received only usual prenatal care, while the experimental subjects received attachment intervention during two or three visits at one to two week intervals. The interventions consisted of three phases. In the first intervention, the mother would feel for fetal parts daily. The second intervention involved the mother focusing attention on fetal activity and how maternal behavior might influence fetal activity. For the third intervention, the mother was encouraged to rub, massage, or stroke her abdomen over the fetus. During the second to fourth day following delivery, the mother's levels of attachment were measured by noting the frequency of specific maternal behaviors. Carter-Jessop found a significant difference in the maternal bonding scores of mothers who had received intrauterine attachment intervention and those who had not, leading to the following conclusions: (1) A human maternal attachment process probably is present by at

least the third trimester; and (2) Maternal-fetal attachment can be enhanced by attachment interventions administered during the third trimester. The results of Carter-Jessop's study hold definite implications for nursing practice, inasmuch as nurses would be the health care personnel providing the instruction and follow-up of these interventions. Also benefiting from the study may be other health professionals in the field of child development.

Variables have been theorized to influence maternal-fetal attachment. Such variables are: age, race, education, number of pregnancies, socioeconomic status, whether the pregnancy was planned, perception of fetal movement, whether the patient viewed her fetus via ultrasonography, and ordinal position of the baby in the family (Leifer, 1980; Cranley, 1981; Kemp & Page, 1987). Personality characteristics of self-esteem, perception of stress, and social support also have been examined (Cranley, 1981; Gaffney, 1986; Koniak-Griffin, 1988), as has the impact of health variables on maternal-fetal attachment, specifically physical symptoms and obstetrics risks (LoBiondo-Wood, 1985; Kemp & Page, 1987). Gaffney (1988) concluded

that further empirical investigations are needed before definitive conclusions about the impact of demographic variables on maternal-fetal attachment can be made.

Cranley (1981) was perhaps one of the earliest to study maternal-fetal attachment. She developed the first, and probably most often utilized tool for assessing the concept of maternal-fetal attachment, a tool entitled the Maternal-Fetal Assessment Scale (MFAS). The MFAS is a 24-item scale with five subscales which measures the extent of maternal-fetal attachment (MFA) during pregnancy. The five subscales are intended to explore different aspects of the maternal-fetal relationship: (1) differentiation of self from fetus, (2) attributing characteristics and intentions to the fetus, (3) interaction with the fetus, (4) giving of self, and (5) role taking. The subjects for Cranley's study were two groups of pregnant women. The first group was comprised of 41 women enrolled in antepartal classes at a vocational and technical school. The second group consisted of 30 volunteer women enrolled for antepartal health care in the office practices of three obstetricians. Both groups were between 35 and 40 weeks gestation at the

time they completed the instrument (MFAS). The mean scores for these two groups revealed no significant differences between the groups. The findings of Cranley's study support the existence of maternal-fetal attachment behaviors. Scores on the subscales of the MFAS suggest a hierarchy of behaviors, with some behaviors being more prevalent than others in the third trimester.

#### Fetal Movement

Fetal movement has been hypothesized to be a significant variable affecting changes in a pregnant woman's feelings of attachment to her fetus (Leifer, 1980). The feeling of life within is a very special, private experience.

According to Rubin, "The pace of being pregnant quickens, and all the tasks of pregnancy are undertaken more seriously" (1975, p. 149). With the perception of fetal movement, the woman becomes increasingly aware of the fetus as a viable and separate individual. The mother's growing bond is evidenced by her behavior. Klaus and Kennel (1976) concur with this concept in their conclusion that strong evidence exists to suggest that, once fetal movement begins, the pregnant woman

becomes more aware of the developing life within, and an attachment to the fetus begins.

Lerum and LoBiondo-Wood (1989) addressed the question of whether maternal age, the physical symptoms of pregnancy, and experiencing fetal movement are related to maternal-fetal attachment. Their study consisted of a convenience sample of 80 primigravidas and multigravidas from a clinic in the midwest. Of the 80 women, 38 were tested prior to experiencing fetal movement and 42 were tested after experiencing fetal movement. Each woman was asked to complete two instruments, the Maternal-Fetal Attachment Scale (MFAS) and the Pregnancy Symptoms Checklist (PSC). In addition, each woman was asked to provide demographic data. In the study by Lerum and LoBiondo-Wood all subjects were personally approached by the investigator during a scheduled antepartum visit and were given a copy of an introduction to the study and a request for their participation. They were asked to read and sign a consent form that assured them of confidentiality and the right to drop out of the study at any time. Subjects were then asked to fill out the questionnaire and demographic information sheets. Results of the

Lerum and LoBiondo-Wood study indicated no significant relationship between either maternal age or physical symptoms of pregnancy and maternal-fetal attachment. A significant relationship was found between maternal-fetal attachment and perception of fetal movement. Demographic data indicated that women with relatively modest incomes possessed high levels of maternal-fetal attachment behaviors. This finding may reflect feelings of career-oriented women who may have anticipated the changes that pregnancy and a new infant would create in their lifestyle and independence. Also, ultrasound scans were significantly correlated with maternal-fetal attachment, implying that maternal recognition of the fetal form may be a contributing element of the attachment process.

Heidrich and Cranley (1989) not only studied the effects of fetal movement on maternal-fetal attachment, but added the variables of ultrasonography and amniocentesis. Ninety-one women who were in the second trimester of pregnancy participated in this study, which included both primiparas and multiparas. Although the researchers did not indicate how subjects were selected for this study, they did indicate that

subjects were assigned to one of three groups according to their plan of obstetric care (e.g., amniocentesis group, ultrasound group, and a control group that received neither procedure).

After securing the subjects' consent, data were collected during clinic visits at approximately sixteen weeks gestation and again at 20 weeks, as the women waited for their amniocentesis, ultrasound, or prenatal physician visits. The subjects completed a demographic questionnaire, the MFAS (Cranley, 1981), and a second scale entitled the Perception of the Fetus (POF). The POF scale was developed for this study to assess the woman's perception of fetal growth and development. The scale consisted of ten items describing intrauterine life and was generated from books and pamphlets available to the general public (Heidrich & Cranley, 1989). Data analyses were carried out using both repeated measures analysis of variance and a priori contrasts. Results reported indicated no significant differences among the three groups of subjects in terms of education, occupation, marital status, or parity. With regard to maternal-fetal attachment, the fetal movement factor proved to be



significant with women who had experienced fetal movement scoring higher on the attachment scale. No significant differences were found in MFAS scores among amniocentesis, ultrasound, and control groups. Results of the POF indicated that, over all, the women rated their fetus as very developed and often as more developed than would be scientifically accurate for gestational age. The researchers concluded that, for the women in this study, feeling fetal movement earlier in pregnancy appeared to be positively related to attachment to the fetus. This was true regardless of whether the women experienced amniocentesis or an ultrasound. Researchers also reported a need for replication of their studies as well as for studies which focused on all three trimesters of pregnancy (Heidrich & Cranley).

#### Ultrasonography

Few studies exploring the psychological impact of modern diagnostic procedures on pregnant women have been conducted. This is true, largely because the affective aspect has been viewed as secondary in importance to the technological information obtained which facilitates diagnosis, therapy, and prognosis.

Ultrasonography was, in fact, developed as a diagnostic technique in Europe in the late 1950's and was first used in the United States in 1964 (Milne & Rich, 1981). Because of its non-invasive character, sonography was soon utilized in many areas of health care, including obstetrical care. Bratlow (1983) speculated that early attachment via ultrasound might have many positive effects, such as: better maternal nutrition, elimination of drug use, and better compliance toward obstetric care (e.g., regularity of prenatal visits).

Advances in electronic technology in the early 1970's facilitated the development of a real-time scanning technique which gave a "dynamic" image of the fetal structure in utero. Today, the majority of modern obstetrics units in the United States possess the capability of using ultrasonography in the care of patients (Milne & Rich, 1981). This is likewise true of many health care clinics and physicians' offices which serve obstetrical clients.

One of the earliest studies involving ultrasound was conducted in 1978 to delineate the effects of ultrasonography on the pregnant woman's image of her fetus (Kohn, Nelson, & Weiner, 1980). The study was

conducted at the Antenatal Testing Unit of Pennsylvania Hospital, which provides ultrasound services for the hospital, as well as for numerous referring institutions. One hundred women in various stages of pregnancy who were referred for obstetric ultrasound were questioned before and after viewing their fetuses through real-time ultrasonographic scanning. The prerequisite for inclusion in this study was that the patients had not previously seen a sonographic image of their current or any previous pregnancies. Prior to the ultrasound procedure, all subjects were asked to complete a questionnaire designed to collect subjects' perceptions of fetal anatomy, characteristics, and well-being. Immediately following the procedure, all patients were asked to complete a similar questionnaire. Comparison of pre- and post-scan responses suggested changed perceptions regarding the image of the fetus. Results indicated a significantly increased attachment to the fetus, as evidenced by the comments several subjects made later in their pregnancies. Less anticipated was a lack of correlation of responses to certain demographic

criteria (e.g., socio-economic background, education, age).

Milne and Rich (1981) explored some of the cognitive and affective aspects of ultrasonography. A cross-sectional study of 20 pregnant women who were undergoing sonography in the second trimester and early part of the third trimester of pregnancy was conducted. Subjects' gestations varied from 20 to 35 weeks. Each woman was observed and interviewed in the naturalistic setting of a hospital sonography department. Behavioral samples were obtained before, during, and immediately after sonography. Each woman's verbal and non-verbal behaviors were recorded in continuous narrative style protocols. The results were summarized in the following four areas:

#### Pre-sonar

Both verbal and nonverbal behaviors were strongly suggestive of anxiety, regarding both the procedure itself, as well as the content and significance of the information which the procedure would elicit.

#### Intra-sonar

Subjects' behaviors indicated readiness to obtain information about their babies and active involvement

in image formation. All of the women were able to form personally meaningful images of their babies in utero. Affective responses to identified structures appeared to provide positive feedback of the perceptual process.

#### Post-sonar

Affective responses indicated enhanced awareness of the baby within and some degree of reassurance of its viability and wholeness. Some of the women evidenced attachment behaviors and the desire to share the experience and knowledge with significant others.

The results of Milne and Rich's study (1981) suggest that ultrasonography, in addition to its diagnostic value, has implications for enhancing a pregnant woman's awareness of her fetus within, thereby facilitating the process of attachment. Milne and Rich (1981) concluded that implications for health care are significant. The high levels of anxiety experienced by the subjects prior to sonography might be alleviated by careful explanations of both the procedure and the type of information which it is capable of eliciting. In terms of future research, Milne and Rich (1981) suggested further study of the effects of sonography on the process of attachment before and after birth.

Further comparisons could also be made between women who had experienced sonography during pregnancy and those who had not. Also suggested was a study to determine the point during pregnancy that seems to be psychologically most advantageous for sonography.

Observation of clients undergoing ultrasonography late in the first trimester of pregnancy or early in the second trimester led Fletcher and Evans (1983) to suggest that this procedure promotes the bonding process prior to quickening. Their interviews with clients indicated that, after visualization of the fetus, the woman felt "a bond of loyalty toward the fetus" (p. 392). This degree of prenatal attachment has typically been associated with the woman's experience of fetal movement later in pregnancy.

#### Summary

Most studies reviewed indicated that continued research is necessary on the relatively new concept of maternal-fetal attachment to identify factors that promote or hinder attachment. Lerum and LoBiondo-Wood's (1989) study suggested implications for nursing practice, as well as for further study. They proposed that acknowledgement of the concept of

maternal-fetal attachment by health care providers (e.g., nurses) is the first step in helping new mothers bond with their children. A relationship between socio-economic levels and ultrasound visualization was also strongly suggested by the study.

Lerum and LoBiondo-Wood (1989) also suggested that research is needed to explore if and how maternal-fetal attachment may be related to ultrasound performed at different points in gestation. Fetal movement and ultrasonography are two of the variables for which further study has been suggested (Kohn, Nelson, & Weiner, 1980; Milne & Rich, 1981; Heidrich & Cranley, 1989; LoBiondo-Wood, Vito, & Brage, 1989).

Most researchers indicated that, to date, a vast majority of the studies has been conducted using white, middle-income subjects who reside in large (populations greater than 100,000) metropolitan communities (Carter-Jessop, 1981; Gaffney, 1988; Grace, 1989; Heidrich & Cranley, 1989; Lerum & LoBiondo-Wood, 1989). Consequently, researchers cited here suggested that consideration should be given to subjects of more diverse cultures, socio-economic levels, and maternal ages.

In addition, studies that focus on subjects at different points of their pregnancy were suggested. Further empirical investigations were needed before definitive conclusions could be reached regarding the impact various demographic variables might have on maternal-fetal attachment (LoBiondo-Wood, 1985; Koniak-Griffin, 1988). The current study adds to nursing's existing body of knowledge by examining the effects of perceived fetal movement and of pregnant women viewing their fetus via ultrasonography, on maternal-fetal attachment.



## CHAPTER III

## METHODOLOGY

In this chapter, the research design, subjects, instruments, methods to protect rights of subjects, and data gathering procedure are described. The purpose of this study was to examine the effects of perceived fetal movement and/or viewing of the fetus by the pregnant woman via ultrasonography on maternal-fetal attachment. Perceived fetal movement and viewing of the fetus by the pregnant woman via ultrasonography are the independent variables, whereas maternal-fetal attachment is the dependent variable.

The hypotheses tested were:

1. Pregnant women who have perceived fetal movement will score significantly higher on the Prenatal Maternal Attachment Scale (PMAS) than pregnant women who have not perceived fetal movement.
2. Pregnant women who have viewed their fetus via ultrasonography will score significantly higher on the Prenatal Maternal Attachment Scale (PMAS) than they did before viewing their fetus via ultrasonography.
3. Pregnant women who have viewed their fetus via ultrasonography will score significantly higher on the

Prenatal Maternal Attachment Scale (PMAS) than pregnant women who have not viewed their fetus via ultrasonography.

#### Research Design

To test the hypotheses two research approaches were used. A comparative descriptive approach was used to test differences in PMAS scores between pregnant women who had perceived fetal movement and those who had not. A quasi-experimental design was used to test differences in PMAS scores between pregnant women who had experienced ultrasonography and those who had not. Campbell and Stanley (1963) conclude that the quasi-experimental design is best used when the researcher lacks control over who will receive an intervention (independent variable), when that intervention will occur, and/or the ability to randomize selection of subjects.

The specific quasi-experimental design utilized in this study was the nonequivalent control group design. Campbell and Stanley (1963), refer to the nonequivalent control group design as "one of the most widespread experimental designs in educational research and involves an experimental group and a control group both

given a pretest and a posttest, but in which the control group and the experimental group do not have pre-experimental sampling equivalence" (p.47). The design for this study was a modified nonequivalent control design in that random assignment of the independent variable was not possible. Administration of a preassessment and postassessment test to both groups, and non-random assignment of subjects to the groups are the design's distinguishing features. Obviously, the variable of pregnant women viewing their fetus via ultrasonography did not allow for randomly assigning subjects to either a control group or an experimental group as their physicians were the ones recommending the ultrasound.

#### Subjects

The settings from which subjects were drawn included obstetricians' offices and the radiologic department of a local hospital in a midwest community of approximately 80,000 people. A control group and an experimental group were used. Thirty-three pregnant women in the first or second trimester of gestation who presented themselves for a scheduled obstetrics examination, but were not scheduled for

ultrasonography, constituted the control group.

Twenty- three of those women were in their first trimester of pregnancy and had not perceived fetal movement. Ten were in their second trimester of pregnancy and had perceived fetal movement. Criteria for inclusion in the control group included:

1. Diagnosed pregnancy in the first or second trimester of gestation.
2. Scheduled obstetrics examination.
3. Ability to speak and read English.
4. Consent to participate.

Forty six pregnant women in the first or second trimester of pregnancy who presented themselves for a scheduled diagnostic ultrasonography constituted the experimental group. Twenty three of those women were in their first trimester of pregnancy and had not perceived fetal movement. Twenty three were in their second trimester of pregnancy and had perceived fetal movement. Criteria for inclusion in the experimental group included:

1. Diagnosed pregnancy in the first or second trimester of gestation.

2. Scheduled for first diagnostic ultrasonography of current pregnancy.
3. Ability to speak and read English.
4. Consent to participate.

Fetal movement was investigated with both the control group and the experimental group.

Table 1 (p.39) depicts characteristics of the subjects.

As Table 1 (p.39) indicates, a majority of the subjects was 22-39 years of age with ages ranging from 16-39 years, and all but 7 of the subjects were Caucasian. Likewise, a majority of subjects had at least a high school education with over half having attended college or having received a college degree. In addition, although over half of the subjects were married, the control group contained more single and separated/divorced subjects than the experimental group. Finally, 48 of 79 subjects were multiparas, a majority of the pregnancies was planned.

#### Instruments

Two instruments were used to collect data, the Prenatal Maternal Attachment Scale (PMAS) and a Demographic Questionnaire. Each is explained.

Table 1

Characteristics of Subjects

Variable	Control (n=33)		Experimental (n=46)		Combined (n=79)	
Age	No.	%	No.	%	No.	%
16-21	12	15	6	8	18	23
22-29	14	18	27	34	41	52
30-39	7	9	13	16	20	25
Race						
Caucasian	29	37	43	54	72	91
African-Am.	3	4	3	4	6	8
Other	1	1	0	0	1	1
Education						
High School	15	19	13	16	28	35
Att. College	10	13	13	16	23	29
Col. Degree	6	8	19	24	25	32
Grad. Deg.	2	3	1	1	3	4
Marital Status:						
Single	11	14	4	5	15	19
Married	19	24	42	53	61	77
Separated	1	1	0	0	1	1
Divorced	2	3	0	0	2	3
Pregnancy:						
Primipara	17	22	14	18	31	39
Multipara	16	20	32	41	48	61
Planned Preg.:						
Yes	20	25	32	41	52	66
No	13	16	14	18	27	34

The Prenatal Maternal Attachment Scale (PMAS)

In order to assess maternal-fetal attachment, the Prenatal Maternal Attachment Scale (LoBiondo-Wood, Vito, & Brage, 1989) was utilized (See Appendix A). Consent to use the PMAS was obtained from its authors (See Appendix B). The conceptual framework for the

development of the scale was based on Bowlby's (1958) attachment theory and Rubin's (1975) theory of maternal behaviors in pregnancy. Items generated from theory, the Maternal Fetal Attachment Scale (Cranley, 1981), previous research, and observations from research were formatted into a four point Likert scale.

The PMAS authors submitted these items to a panel of experts who judged them for clarity and content validity. Seventy-one items were tested on a cross sectional sample of 811 women at all stages of normal pregnancy. Corrected item to total correlations were then calculated for the 71 items. Thirty-one items which reduced reliability (internal consistency) or were judged to be redundant (e.g., doublets) were deleted. Subjects who failed to complete all of the items were eliminated from further analysis. The remaining 39 items of the PMAS were submitted for factor analysis (N = 650). Based on the results of the factor analysis, three factors which accounted for 34.5% of the variance were eliminated (LoBiondo-Wood, Vito, & Brage, 1989).

Ten of the 39 items deal with feelings or behaviors relevant only after fetal movement is

experienced. Cronbach's alpha for the 39 items in the post-fetal movement group was .89 ( $N = 478$ ), while Cronbach's alpha for the 29 items in the pre-fetal movement group was .90 ( $N = 172$ ). Cronbach's alpha for the 29 items relevant to all stages of pregnancy ( $N = 650$ ) was .87.

Findings from the LoBiondo-Wood, Vito, and Brage study (1989) indicated that the PMAS can detect differences in maternal-fetal attachment during pregnancy and can provide useful longitudinal information for clinicians and researchers who wish to assess the earliest mother-child relationships. Consequently, the PMAS was selected for utilization in this study. One of the most advantageous features of the PMAS is that it was constructed in a way that allows the researcher to detect differences between subjects who have experienced fetal movement and those who have not. Items one through 29 were administered to all pregnant women while items 30 through 39 were administered only to women who had experienced fetal movement.



### Validity

Validity is the degree to which an instrument measures what it purports to measure (Polit & Hungler, 1987). Content validity is the degree to which the items on a tool adequately represent the domain content addressed by the tool (Polit & Hungler). In the current study, the content validity of the PMAS was assessed by three content specialists: a clinical nurse specialist in maternal-newborn care, a prenatal care coordinator, and a maternal-newborn nurse educator. The Content Validity Index (CVI), (Waltz, Strickland, & Lenz, 1984), was completed and was found to be acceptable at .90.

### Reliability

Reliability is the degree of consistency with which an instrument measures the construct it is designed to measure (Polit & Hungler, 1987). Reliability of the PMAS was assessed through use of the test-retest method on a pilot study sample. The Cronbach-Alpha Reliability Coefficient (Waltz, Strickland, & Lenz, 1984) for the scores on the PMAS was computed and found to be acceptable at .92.

### Demographic Questionnaire

In addition to the PMAS, subjects were asked to complete a demographic questionnaire designed by the researcher, which solicited general information about themselves and the current pregnancy (e.g., age, education, whether pregnancy was planned). The Demographic Questionnaire appears in Appendix C.

### Protection of Rights of Subjects

Consideration was given to the protection of the participants' rights. Prior to data collection, the research proposal was approved by the University Human Subjects Committee and the Hospital Nursing Research Review Committee (See Appendices D and E). In addition, the appropriate personnel at each of the selected sites granted permission to request pregnant women visiting the site to participate in the study (See Appendices F and G).

Participation in the study was voluntary. The participant letter explained the purpose and value of the study, as well as the role of the participant in the study. The letter requested participation in the study and provided assurance that the individual was under no obligation to become a part of the study.

The letter also explained that participants were free to discontinue participation in the study at any time without jeopardizing in any way their relationship with the physician, nurses and/or institution involved.

Participants were assured of confidentiality as all data were obtained using a coding system which was accessible only to the researcher. In addition, they were informed that results would be reported as group norms, the researcher would be the only person to have access to the completed questionnaires, and questionnaires would be destroyed upon the study's completion. The participants signed the informed consent attached to the letter before any data were collected. Results of the study were made available to the participants if they requested results (See Appendix H).

#### Data Gathering Procedure

A pilot study was conducted utilizing 10 subjects to determine the length of time for completion of the questionnaires and to identify any potential problems which might occur during the data gathering process. Subjects in the pilot study experienced no difficulties in understanding the directions or in completing the

questionnaires. Therefore, no changes were made in the questionnaires or in the procedure.

As the prospective subjects presented themselves for their scheduled appointments, they were approached with a request for their participation in the study. They were given a letter of introduction which explained that the researcher is a graduate student pursuing a Master of Science in Nursing Degree (See Appendix H). The letter of introduction described the study, as well as the role of the participants in the study.

Attached to the letter of introduction was a consent to participate form for the subject and a witness to sign (See Appendix H). Once the consent to participate form was signed, participants in both the control group and the experimental group were asked to complete the demographic questionnaire and the PMAS, a process which took approximately ten minutes. This procedure constituted the preassessment.

Once control group participants completed the preassessment procedure, appreciation was expressed by the researcher for their participation in the study and they were reminded that a follow-up PMAS questionnaire

would be mailed to them within one week. Directions requested that they complete and return the questionnaire as soon as possible, but no later than five days after it was received (See Appendix I). A pre-addressed, stamped envelope was provided for participants use.

After experimental group participants completed the preassessment procedure, the diagnostic ultrasonography which allowed the subjects to view their fetus was performed. Following the completion of the ultrasound procedure, appreciation was expressed by the researcher for their participation in the study and they were reminded that a follow-up PMAS questionnaire would be mailed to them within one week. Directions requested that they complete and return the questionnaire as soon as possible, but no later than five days after it was received (See Appendix I). A pre-addressed, stamped envelope was provided for participants use. Data from preassessment and postassessment questionnaires were tabulated and statistically analyzed. The results of these analyses are reported in Chapter IV.

## CHAPTER IV

## FINDINGS

The purpose of the study was to examine the effects of perceived fetal movement and/or viewing of the fetus by the pregnant woman via ultrasonography on maternal-fetal attachment. In this chapter, the categorization of women in each group is identified and results of hypotheses testing are described. Subjects who had/had not perceived fetal movement and those who experienced/had not experienced ultrasonography were studied. Table 2 shows subjects in these categories.

Table 2

Fetal Movement Perceived and Ultrasonography  
Experienced by Subjects

Variable		n=79	Percent
Fetal Movement	Perceived	33	42
	Not Perceived	46	58
Ultrasonography	Experienced	46	58
	Not Experienced	33	42

As the table indicates, a majority of the women studied

had not perceived fetal movement (58%) and a majority had experienced ultrasonography (58%).

### Hypotheses Testing

Nonparametric statistics were used in testing the hypotheses. Nonparametric tests are applied when data have been measured on a nominal or ordinal scale. The Likert-type scale of the Prenatal Maternal Attachment Scale (PMAS) renders ordinal data. Therefore the nonparametric Mann-Whitney U test was used in the analyses. The significance level for data analyses was set at  $p < .05$ . Three hypotheses were tested. Data analyses related to each hypothesis are presented below.

#### Hypothesis One

Hypothesis One stated: Pregnant women who have perceived fetal movement will score significantly higher on the Prenatal Maternal Attachment Scale (PMAS) than pregnant women who have not perceived fetal movement.

In testing this hypothesis, the mean rank scores for the first 29 questions of the PMAS were used because questions 30-39 are specific to those who have perceived fetal movement. Using all 39 questions would

have skewed the results in favor of those women who had perceived fetal movement. The mean rank score on the first 29 questions of the PMAS for women who had perceived fetal movement (n=33) was 44.23 of a possible 116 points. The mean rank score on the first 29 questions of the PMAS for women who had not perceived fetal movement (n=46) was 36.97 of a possible 116 points. Table 3 depicts the results of the Mann-Whitney U test for comparing differences between these two groups.

Table 3

Mann-Whitney U Test for Differences in PMAS Scores  
Between Subjects Who Perceived Fetal Movement and Those  
Who Did Not Perceive Fetal Movement

U	Z	2-tailed p
619.5	-1.3877	.1652

As indicated in Table 3,  $p = .1652$ , the difference between the two groups is not significant.

Further analyses of Hypothesis One were conducted. The differences in the mean rank scores for the first



29 questions of the PMAS were computed between women who experienced ultrasonography/fetal movement and women who experienced ultrasonography/no fetal movement. The mean rank score for the 23 women who experienced ultrasonography/fetal movement was 24.63, and for the 23 women who experienced ultrasonography/no fetal movement the mean rank score was 22.37.

Table 4 depicts the results of the Mann-Whitney U test for comparing differences between these two groups.

Table 4

Mann-Whitney U Test for Differences in PMAS Scores Between Women Who Experienced Ultrasonography/Fetal Movement and Women Who Experienced Ultrasonography/No Fetal Movement

U	Z	2-tailed p
238.5	-.5717	.5675

As Table 4 indicates,  $p = .5675$ , the difference between these two groups is not significant.

Women who did not experience ultrasonography were divided into those who had perceived fetal movement and those who had not perceived fetal movement. The Mann-Whitney U test was conducted to detect differences in the mean rank scores for the first 29 questions of the PMAS between these two groups. Women who had perceived fetal movement (n=10) had a mean rank score of 18.45. Those who had not perceived fetal movement (n=23) had a mean rank score of 16.37. Table 5 depicts results comparing differences between these two groups.

Table 5

Mann-Whitney U Test for Differences in PMAS Scores  
Between Women Who Did Not Experience  
Ultrasonography/Fetal Movement and Women Who Did Not  
Experience Ultrasonography/No Fetal Movement

U	Z	2-tailed p
100.5	-.5687	.5696

As Table 5 indicates,  $p = .5696$ , the difference between these two groups is not significant.

### Hypothesis Two

Hypothesis Two stated: Pregnant women who have viewed their fetus via ultrasonography will score significantly higher on the Prenatal Maternal Attachment Scale (PMAS) than they did before viewing their fetus via ultrasonography.

The mean rank scores for the first 29 questions of the PMAS were used because questions 30-39 are specific to those women who have perceived fetal movement and using all 39 questions would have skewed the results in favor of those who had perceived fetal movement.

Forty- six women experienced ultrasonography. The preassessment mean rank score was 43.17. The postassessment mean rank score was 49.83. Table 6 (p. 53) depicts the results of the Mann-Whitney U test for differences between the PMAS scores prior to and after ultrasonography. As Table 6 (p.53) indicates,  $p = .2318$ , the difference between these two groups is not significant.

Table 6

Mann-Whitney U Test for Differences in PMAS Scores  
Prior to and After Ultrasonography

U	Z	2-tailed p
905.0	-1.1957	.2318

Hypothesis Three

Hypothesis Three stated: Pregnant women who have viewed their fetus via ultrasonography will score significantly higher on the Prenatal Maternal Attachment Scale (PMAS) than pregnant women who have not viewed their fetus via ultrasonography.

Forty-six women viewed their fetuses via ultrasonography with a mean rank score on the first 29 questions of the PMAS of 46.36. Thirty-three women had not viewed their fetuses via ultrasonography and had a mean rank score of 31.14 on the first 29 questions of the PMAS. Table 7 (p. 54) depicts the Mann-Whitney U test for differences between these two groups.

Table 7

Mann-Whitney U Test for Differences in PMAS Scores  
Between Women Who Had Experienced Ultrasonography and  
Women Who Had Not Experienced Ultrasonography

U	Z	2-tailed p
466.5	-2.9097	.0036

As Table 7 indicates,  $p = .0036$ , the difference between these two groups is significant.

Additional Findings

Mean scores were computed on the PMAS for pregnant women who had and had not perceived fetal movement. Those pregnant women who had perceived fetal movement responded to all 39 questions on the PMAS with a mean score of 122 of a possible 156 points. Women who had not perceived fetal movement responded to the first 29 questions on the PMAS with a mean score of 90 of a possible 116 points.

Summary

As revealed by statistical analyses, the findings relevant to Hypothesis One did not support the

hypothesis that pregnant women who have perceived fetal movement will score significantly higher on the Prenatal Maternal Attachment Scale (PMAS) than pregnant women who have not perceived fetal movement.

As revealed by statistical analysis, the findings relevant to Hypothesis Two did not support the hypothesis that pregnant women who have viewed their fetus via ultrasonography will score significantly higher on the Prenatal Maternal Attachment Scale (PMAS) than they did before viewing their fetus via ultrasonography.

However, statistical analysis revealed that the findings relevant to Hypothesis Three did support the hypothesis that pregnant women who viewed their fetus via ultrasonography will score significantly higher on the Prenatal Maternal Attachment Scale (PMAS) than pregnant women who have not viewed their fetus via ultrasonography.

## CHAPTER V

### DISCUSSION OF RESULTS

The purpose of the study was to examine the effects of perceived fetal movement and/or viewing of the fetus by the pregnant women via ultrasonography on maternal-fetal attachment. Three hypotheses were tested.

In this chapter the findings are discussed, limitations are identified, significance of the study for nursing are explicated, and topics for further research are recommended. A summary concludes the chapter.

#### Discussion of Findings

A possible explanation for the absence of a statistically significant difference between the PMAS scores of women who have and have not experienced fetal movement is the fact that only the first 29 of 39 questions on the PMAS were used in the analysis. As stated previously, the last ten questions were not included in the analysis because questions 30-39 are specific to women who have perceived fetal movement. It was concluded that using all 39 questions would have skewed the results in favor of those women who have

perceived fetal movement. For the very same reason--their specificity to women who have perceived fetal movement--perhaps the exclusion of questions 30-39 was responsible for no statistically significant difference between the two groups' PMAS responses. However, the results of other research that focused on the correlation between fetal movement and maternal-fetal attachment (e.g., Carter-Jessop, 1981; Kemp & Page, 1987; Heidrich & Cranley, 1989; and Lerum & LoBiondo-Wood, 1989) indicated a statistically significant difference between the maternal-fetal attachment of women who had experienced fetal movement and those who had not. Each of these studies used an instrument other than the PMAS. Consequently, one might conclude that, at least as it was used in this study, the PMAS did not possess the ability to demonstrate significant differences between the maternal-fetal attachment of women who had perceived fetal movement and those who have not.

There are several possible explanations for the absence of a statistically significant difference between preassessment and postassessment scores on the PMAS of pregnant women who viewed their fetus via



ultrasonography. One reason was the difference in approach to the patient by persons performing the ultrasonography. A majority of the ultrasounds was performed at one of two sites: a hospital radiology department and obstetricians' offices. The hospital site was heavily scheduled for ultrasounds of medical/surgical nature as well as for doing routinely scheduled obstetrical ultrasounds for several physicians. The hospital technicians had minimal time to spend explaining findings and/or answering questions at the time of the procedure. Those ultrasounds performed at the obstetricians' offices were less hurried with more individualized attention given to explanations and patient questions. Thus, the positive effects of viewing the fetus via ultrasonography on maternal-fetal attachment may not have been maximized by the pregnant women experiencing ultrasounds in the hospital radiology setting.

Time that elapsed between completion of the questionnaires prior to and following the viewing of the fetus via ultrasonography may also have been a factor. A minimum of one weeks' time elapsed between

completion of the questionnaires and the viewing of the fetus via ultrasonography.

follow-up PMAS by the subjects. In studies by Cranley (1981), LoBiondo-Wood (1985), Kemp and Page (1987), and Gaffney (1988), similar attachment tools were administered either one time only, or at intervals which ranged from hours to several weeks or months during pregnancy and into the postpartum period. Also, at the time of this study, there was limited literature documenting studies which used the PMAS tool.

The possibility also exists that the early time frame in pregnancy (12-14 weeks gestation) during which routine ultrasounds were performed on subjects in this study may have been a factor in the absence of significant differences on the PMAS prior to and after ultrasonography. LoBiondo-Wood (1985), in utilizing similar attachment tools, found that increases in prenatal attachment were greater between 21-26 weeks of gestation than between 4-11 or 12-16 weeks of gestation. Likewise, Heidrich and Cranley (1989) concluded that some identified behaviors referenced in attachment tools may likely occur in more advanced stages of pregnancy.

Pregnant women who viewed their fetus via ultrasonography during the current pregnancy

demonstrated scores on the PMAS which were significantly higher than pregnant women who had not. In studies by Kohn, Nelson, and Weiner (1980) and Milne and Rich (1981) results indicated a significant increase in maternal-fetal attachment evidenced by questionnaires and interviews. Both verbal and nonverbal responses to an increased awareness of the baby within and its viability and wholeness were noted. These authors further concluded that some of the women evidenced attachment behaviors and the desire to share the experience with significant others. This study likewise indicated that attachment behaviors were significantly evidenced by those pregnant women who viewed their fetus via ultrasonography.

#### Relation of Findings to Theoretical Basis of Study

The theories of Bowlby, Rubin and Roy were used as theoretical bases in this study. Bowlby (1958) described attachment behavior as any form of behavior that results in a person attaining or retaining proximity to some other preferred/significant individual. In this study pregnant women who experienced ultrasonography indicated attachment to

their fetus more significantly, as measured by the PMAS, than those pregnant women who had not experienced ultrasonography. Indications of this attachment included responses on the PMAS such as: "I rub my stomach to feel the baby", "The baby's movement gives me a sense of well being", and "I talk to my unborn baby".

Rubin (1975) described prenatal components of the attachment process beginning with first sensations of fetal presence such as perceptions of fetal movement. These experiences validate for the mother an awareness of another separate being and foster development of an affective tie to that separate being. In this study attachment behavior, as related to the variable of perceived fetal movement, was assessed by PMAS scores. Women who had perceived fetal movement completed all 39 questions on the PMAS with a mean score of 122 out of a possible 156 points (78%), placing them in the upper quartile of scores.

Roy's Adaptation Model of Nursing (1970) described the individual in terms of an adaptive system affected by external and internal stimuli known as the environment. The adaptive responses of role function

and interdependence are particularly applicable to attachment behaviors. Role function focuses on expressive behaviors which the individual occupies in society. Interdependence focuses on interactions related to the giving and receiving of love, respect and value.

Role function behaviors and interdependence interactions indicating maternal-fetal attachment are manifested in the pregnant woman's expressions of caring for the fetus. These expressions of adaptive behavior include, but are not limited to, talking to the fetus, rubbing the pregnant abdomen and practicing positive healthcare measures throughout pregnancy. In this study, these expressions of adaptive behaviors were measured by the PMAS and revealed that those women who viewed their fetus via ultrasonography indicated significantly increased attachment behaviors when compared to pregnant women who did not experience ultrasonography.

Overall, the subjects in this study indicated attachment and adaptive behaviors. Specifically significant to these behaviors was the viewing of her fetus by the pregnant woman via ultrasonography.

### Limitations of The Study

Limitations were evident in this study. First of all, the study sample focused on a restricted population, limiting generalizability of the findings. As Table 1 (p.39) indicates, the majority of the participants were married, Caucasian, multiparas between the ages of 22 and 29 who were experiencing planned pregnancies.

In addition, the sampling system was based on voluntary participation as opposed to random selection. As Borg and Gall (1983) point out, there can be significant differences between people who choose to participate in studies and those who do not. Consequently, this condition further restricted the generalizability of the study's results.

The current medical practice of routinely conducting ultrasonography presented the researcher with an interesting challenge. In order to establish a control group of significant numbers, participants had to be enrolled in the study early in the first trimester of their pregnancies--before they had experienced ultrasonography. This condition resulted in a control group whose members were all in their

first trimester of pregnancy, thereby constituting another limitation of the study.

The majority of women who participated in the study were multiparas (70%). Since the variable of the number of pregnancies functioned as an uncontrolled variable, its possible effects on the study's outcomes are not known.

A second limitation related to the large number of multiparas who served as subjects is the possibility that they experienced ultrasonography with a previous pregnancy. Therefore, it is plausible that multiparas' reactions to a second or third ultrasonography were significantly different from their reactions to the ultrasonographies experienced with their first pregnancies. Here again, the study did not control for this variable nor were multiparas asked if they experienced ultrasonography with a previous pregnancy.

A final possible limitation of the study is the fact that subjects could not be assigned randomly to either the control group or the experimental group. Subjects were assigned to groups on the basis of ultrasonography, with those having experienced ultrasonography with their current pregnancy being

assigned to the experimental group and those having not experienced ultrasonography with their current pregnancy being assigned to the control group. The researcher had no way to assure initial equivalence between the two groups on variables other than experiencing ultrasonography.

#### Significance of the Study for Nursing

The findings of this study have implications for nursing as they relate to the expanding body of knowledge regarding the concept of prenatal maternal attachment. The study's findings indicate that pregnant women who viewed their fetus via ultrasonography showed a significant increase in maternal-fetal attachment behaviors over pregnant women who did not view their fetus via ultrasonography. The nurse working with pregnant women in the prenatal period can take advantage of these findings to positively reinforce attachment behaviors such as talking to the fetus and patting the pregnant abdomen to convey caring for the fetus. Thus the nurse through patient education and anticipatory guidance can help pregnant women strengthen their feelings and behaviors



of attachment to their fetus. Caution must be exercised in assuming that fetal movement does not affect attachment behaviors although so indicated in findings of this study. The nurse can still encourage attachment behaviors such as listening to soothing music and patting the pregnant abdomen in response to fetal movements to strengthen maternal-fetal attachment. This encouragement by the nurse, in response to the pregnant woman's excitement when first perceiving fetal movement in her pregnancy, may serve to enhance these and other behaviors indicative of maternal-fetal attachment.

In some settings the nurse may be performing the ultrasound or at least be present to guide pertinent observations of the fetus for the pregnant woman during the procedure. Because pregnant women in this study indicated their tendency to increased maternal-fetal attachment behaviors after viewing their fetus via ultrasonography, the nurse can identify pertinent physical characteristics of the fetus such as the heart beating, lung movements and skeletal development. Building on this positive experience for pregnant women of viewing their fetus via ultrasonography, the nurse

may encourage behaviors such as talking to the fetus, calling the fetus by a pet name, rubbing or massaging the pregnant abdomen, listening to soothing music and reading to the fetus to enhance maternal-fetal attachment. The nurse may find this an optimal opportunity also to emphasize other important areas of maternal health practices such as appropriate dietary habits, avoidance/abstinence of drugs and compliance with prescribed prenatal visits. In settings where a technician performs the ultrasound, the nurse may act as a liaison to these ancillary healthcare workers to encourage them also to foster increased maternal awareness of fetal growth and development and related observations during the ultrasound procedure.

Utilizing findings of this study, the nurse educator can facilitate opportunities for nursing students to use the concept of maternal-fetal attachment in clinical practice experiences. This concept can be implemented in settings such as clinics, antepartal units and ultrasound departments.

The nurse can correlate a team approach with other healthcare providers such as social workers, dieticians and counselors to facilitate an increased awareness of

maternal-fetal attachment and the need to provide anticipatory guidance for prenatal care that culminates in a positive pregnancy experience and outcome.

#### Recommendations for Further Research

Recommendations for further research include investigations that would:

1. Determine the point or trimester in pregnancy that seems to be most advantageous for assessing the effects of fetal movement and/or ultrasonography on prenatal attachment.
2. Detect differences in attachment behaviors related to fetal movement and/or ultrasonography between primiparas and multiparas.
3. Compare Prenatal Maternal Attachment Scale (PMAS) scores and scores from the Neonatal Perception Inventory (NPI), a questionnaire designed to measure mothers' perceptions of their infants, to detect significant correlations.
4. Describe differences between prenatal attachment behaviors of multiparas who have experienced ultrasonography in a previous pregnancy and primiparas who have not had this experience.

5. Determine the relationship between maternal fetal attachment behavior and subsequent parenting behavior.

#### Summary

This study was conducted for the purpose of examining the effects of perceived fetal movement and/or viewing of the fetus by the pregnant woman via ultrasonography on maternal-fetal attachment. A review of literature indicated that continued research was necessary on the relatively new concept of maternal-fetal attachment to identify factors that promote or hinder attachment. Theoretical concepts relative to attachment, maternal behavior in pregnancy and adaptation were used in the development of the study.

Comparative descriptive and quasi-experimental designs were used to test differences in data relative to the effects of fetal movement and/or ultrasonography on maternal-fetal attachment. The Prenatal Maternal Attachment Scale was used to assess attachment. A demographic questionnaire was used to obtain relevant variables.

Statistical analyses did not support the hypothesis that pregnant women who had perceived fetal movement would score significantly higher on the Prenatal Maternal Attachment Scale than pregnant women who had not perceived fetal movement. Likewise analysis did not support the hypothesis that pregnant women who had viewed their fetus via ultrasound would score significantly higher on the Prenatal Maternal Attachment Scale than they did before viewing their fetus via ultrasound. However, statistical analysis revealed that findings did support the hypothesis that pregnant women who viewed their fetus via ultrasound would score significantly higher on the Prenatal Maternal Attachment Scale than pregnant women who had not viewed their fetus via ultrasound.

Limitations of the study were identified and recommendations for further research made. Findings of the study contribute to the knowledge and practice of nursing. Through cooperative dialogue with other healthcare professionals, nurses are in an optimal position to facilitate client education and anticipatory interventions designed to enhance the concept of maternal-fetal attachment.

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PRENATAL MATERNAL ATTACHMENT SCALE (PMAS)

# PRENATAL MATERNAL ATTACHMENT SCALE

Code Number \_\_\_\_\_

Directions: I would like you to respond to the list of items below about yourself and the baby you are carrying. Check the response that best describes your feelings, thoughts or what is most true about you at this point in your pregnancy. It is your first impression that counts. There are no right or wrong answers. Please do not leave any blanks.

	Definitely YES	YES	NO	Definitely NO
1. I am preparing (or have prepared) a room for the baby.				
2. I try to picture what the baby will look like.				
3. I imagine myself taking care of the baby.				
4. I see my baby as a newborn.				
5. I talk to my unborn baby.				
6. I picture myself feeding the baby.				
7. I read books on baby care.				
8. This is the perfect time for the baby to be coming into my life.				
9. I have decided on a name for the baby.				
10. I dream about my baby.				
11. The baby seems to know when I feel tense or anxious.				
12. I picture myself bathing the baby.				
13. I feel excited about my baby.				
14. I am uncertain about being pregnant.				
15. I feel as if I am already mothering my baby.				

16. I soothe the baby by stroking my abdomen.
17. I refer to my baby by a nickname.
18. I feel as though the baby and I are one.
19. I rub my stomach to feel the baby.
20. I image what my life will be like with the baby.
21. This baby won't seem like a real person to me until it is born.
22. I fantasize about my baby.
23. I have a personal relationship with my baby.
24. I can't imagine myself taking care of the baby.
25. I wonder if the baby thinks and feels inside of me.
26. I can hardly wait to hold the baby.
27. I will wait until after the baby is born to get some clothes.
28. I picture myself playing with the baby.
29. If I were to lose the baby now, it would be like losing a part of myself.

[illegible]

Please answer the following questions only if you have felt your baby move.

30. The baby's movement gives me a sense of well being.
31. The baby responds to the sound of my voice.
32. I wonder if the baby feels cramped in there.
33. I enjoy watching my tummy jiggle as the baby kicks inside.
34. I can almost guess what my baby's personality will be from the way she/he moves around.
35. It seems my baby kicks and moves to let me know she/he is there.
36. I poke my baby to get her/him to kick back.
37. I stroke my tummy to quiet the baby when there is too much kicking.
38. I have bought, borrowed or acquired most of the things I will need for the baby after she/he is born.
39. I feel and pat my abdomen in order to try to figure out where the baby's head, back, arms and legs are.

[illegible]

APPENDIX B

80

Consent to use PMAS

PERMISSION FOR THE PRENATAL MATERNAL ATTACHMENT SCALE

Permission is granted for use of the Prenatal Maternal Attachment Scale under the following conditions:

1. The Prenatal Maternal Attachment Scale (PMAS) is fully referenced.
2. A complete copy of the final results of the study is provided to the author of the PMAS at the conclusion of the study. This should include sociodemographic information and the variables of study. Include other instruments used with references.
3. A report of the internal consistency (Cronbach alpha) and any other reliability or validity assessments made from the study's data.
4. The cumulative results of the studies will be provided to other researchers for reliability and validity information only. Any list of studies that have used the scale will fully cite the investigator(s).

SIGNED: \_\_\_\_\_

*Darlene Shipp*

Please return the original copy to:  
Geri LoBiondo-Wood Ph.D., R.N.  
University of Nebraska College of  
Nursing  
42nd and Dewey Ave.  
Omaha, Nebraska 68105



 University  
of Nebraska  
Medical Center  
College of Nursing

600 South 42nd Street  
Omaha, NE 68198-5330  
102 Fairfield Hall  
Lincoln, NE 68588-0620  
Scottsbluff, NE 69361

March 11, 1991

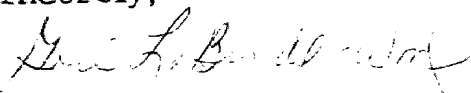
Darlene Shipp  
444 Valley Dr.  
Waterloo, IA 50701

Dear Darlene:

Thank you for your interest in the Prenatal Maternal Attachment Scale. Please find enclosed a copy of the Prenatal Maternal Attachment Scale, a permission sheet for the PMA, scoring instructions, a copy of an abstract from the methodological study (which was presented at the NAACOG's Research Conference July 20-21, 1990 in Denver, Co.) and copies of abstracts from several studies which used the PMA.

If you have further questions, please call.

Sincerely,



Geri LoBiondo-Wood, PhD, RN  
Associate Professor  
Chair, Parent/Child  
Nursing Department

Enc.

GW:ag:

APPENDIX C  
DEMOGRAPHIC QUESTIONNAIRE

83

Code Number \_\_\_\_\_

DEMOGRAPHIC QUESTIONNAIRE

1. \_\_\_\_\_ Today's Date
2. \_\_\_\_\_ Age on Last Birthday
3. \_\_\_\_\_ Race/Ethnicity
4. Marital Status:  
\_\_\_\_\_ Single  
\_\_\_\_\_ Married  
\_\_\_\_\_ Separated  
\_\_\_\_\_ Divorced
5. Highest Educational Level Obtained:  
\_\_\_\_\_ Completed Eighth Grade  
\_\_\_\_\_ Attended High School  
\_\_\_\_\_ High School Graduate  
\_\_\_\_\_ Attended College  
\_\_\_\_\_ College Graduate  
\_\_\_\_\_ Graduate Degree
6. Which Pregnancy is this for you?  
\_\_\_\_\_ First  
\_\_\_\_\_ Second  
\_\_\_\_\_ Third  
\_\_\_\_\_ Fourth  
\_\_\_\_\_ Other (Please specify)
7. Was this pregnancy planned?  
\_\_\_\_\_ Yes  
\_\_\_\_\_ No
8. \_\_\_\_\_ Due Date for This Pregnancy
9. Have you felt your baby move during this pregnancy?  
\_\_\_\_\_ Yes  
\_\_\_\_\_ No
10. Have you ever had ultrasound with a previous pregnancy?  
\_\_\_\_\_ Yes  
\_\_\_\_\_ No

**APPENDIX D**

**85**

**HUMAN SUBJECTS COMMITTEE PERMISSION**

To be completed by the Investigator:

Date Submitted: May 27, 1992

Proposal Title: Effects of Perceived Fetal Movement and Fetal Ultrasound Imagery on Maternal-Fetal Attachment

Investigator: Darlene Shipp, R.N., B.S.N.

Faculty research advisor (for student research): Barbara Haag, R.N., Ph.D.

Return to: Darlene Shipp  
Name

444 Valley Drive

Street Address or Campus Office

Waterloo, Iowa, 50701

City, State, Zip if off campus

To be completed by the Human Subjects Research Review Committee Chairperson:

Date Received: 5 June 92

Decision:

- ☐ Approval, no risk
- ☒ Approval, minimal risk
- ☐ Approval, subjects at risk, but benefits outweigh risks
- ☐ No approval. Subjects at risk or proposal does not adequately address risks, benefits and procedures.

Reasons for Disapproval: \_\_\_\_\_

Suggested Changes: \_\_\_\_\_

please note attached comments

Human Subjects Review Committee Chair: \_\_\_\_\_

Date: 26 June 92

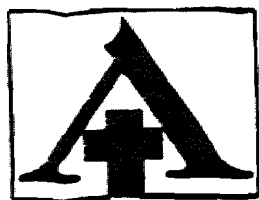
W. L. Williams (1999-1991)

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APPENDIX E

87

NURSING RESEARCH COMMITTEE PERMISSION



# Memo

**Allen  
Memorial  
Hospital**

**TO:** Darlene Shipp, Graduate Student  
**FROM:** Anne Pingenot<sup>&</sup>, Chair, Nursing Research Committee  
**DATE:** July 1, 1992  
**RE:** Permission to begin data collection for research entitled:  
"Effects of Perceived Fetal Movement and Fetal Ultrasound  
Imagery on Maternal-Fetal Attachment".

We have received copies of the materials cited in our correspondence of June 19, 1992. You may now begin data collection. We look forward to receiving a copy of your completed study.

cc: Gail Nielsen  
JoAn Headington

DIRECTOR OF RADIOLOGY PERMISSION



## PERMISSION TO CONDUCT STUDY

My signature at the bottom of this page signifies that Darlene Shipp, R.N., who is conducting a study to assess variables affecting maternal-fetal attachment, has my permission to invite obstetric clients to participate in her study. I understand that participants will be assured that: results will be reported as group norms, the researcher will be the only person to have access to the completed questionnaires, the questionnaires will be destroyed upon the study's completion, participants have the right to refuse or to withdraw from the study at any time without jeopardizing their relationship with their physician and/or nurses, and no cost to them will be incurred.

Neil Nielsen

(Admin. Director of Radiology Services)

10/25/92

(Today's Date)

PHYSICIAN PERMISSION

PHYSICIAN PERMISSION TO CONDUCT STUDY

My signature at the bottom of this page signifies that Darlene Shipp, R.N., who is conducting a study to assess variables affecting maternal-fetal attachment, has my permission to invite my obstetric clients to participate in her study. I understand that participants will be assured that: results will be reported as group norms, the researcher will be the only person to have access to the completed questionnaires, the questionnaires will be destroyed upon the study's completion, participants have the right to refuse or to withdraw from the study at any time without jeopardizing their relationship with their physician and/or nurses, and no cost to them will be incurred.

*Robert Hedison, M.D.*

\_\_\_\_\_  
(Signature of Obstetrician/Gynecologist)

*6-25-92*  
\_\_\_\_\_  
(Today's Date)

Dear Doctor:

As a Drake University graduate student completing my Master of Science in Nursing Degree, I am conducting a study to assess variables affecting maternal-fetal attachment. The purpose of my letter is to ask for your assistance and cooperation with my research.


Subjects for this study include clients who are pregnant and who may or may not be having an ultrasound. The sample will consist of a control group and an experimental group, each which will contain a minimum of 30 participants.

I would like to invite selected clients presenting themselves for scheduled obstetrical visits and/or ultrasonography to participate in the study. An explanation of the study will be provided to potential participants and written permission will be obtained from clients who agree to participate (See enclosures.). To protect the participants' confidentiality, their names will not appear on the questionnaires. Clients will incur no costs for their participation in the study, and they will be free to withdraw from the study at any time.

Both the hospital Nursing Research Review Committee and the Drake University Human Subjects Research Review Committee have approved my request to conduct this research. I am also requesting your written permission to invite your clients to participate in this study. Enclosed please find a permission form and a preaddressed, stamped envelope for your use.

I would be happy to answer any questions you may have regarding the proposed study. In advance, I thank you for your consideration of my request.

Sincerely,



Darlene Shipp, R.N., B.S.N.  
Graduate Student  
Ph.D.  
Drake University

236-7776

ENCLOSURES

Advisor  
Barbara Haag, R.N.,  
Professor of Nursing  
Drake University  
(515) 271-2854

**APPENDIX H**  
**PARTICIPANT LETTER**

**93**

I am Darlene Shipp, R. N. As a graduate student at Drake University completing my Masters of Science in Nursing Degree, I am inviting you to participate in a study that will examine the feelings pregnant women have about their unborn babies during pregnancy.

If you decide to participate, you will be asked to complete:

1. A questionnaire which asks for general information about you and your pregnancy;
2. The Prenatal Maternal Attachment Scale which deals with feelings about your pregnancy and your unborn baby.
3. A follow-up Prenatal Maternal Attachment Scale which will be mailed to you within a week following your appointment. You will be asked to return the completed questionnaire in a preaddressed, stamped envelope which will be provided.

The information gathered from this study will remain confidential. Code numbers will be placed on all forms so that your identity will remain anonymous. All data gathered will be reported as group information and not as individual information, and questionnaires will be destroyed upon the study's completion.

If you decide to participate, you are free to discontinue participation in the study at any time without affecting in any way your relationship with your physician, nurses, and/or institution involved. Should you have questions about the study, please feel free to contact me at 235-3653.

Sincerely,

*Darlene Shipp*  
Darlene Shipp

I have read the information describing this study which will examine the feelings pregnant women have about their unborn babies, and I agree to participate. I understand that my confidentiality will be protected because all study results will be presented as group information and participants will not be identified.

\_\_\_\_\_  
SIGNATURE OF PARTICIPANT

\_\_\_\_\_  
DATE

\_\_\_\_\_  
SIGNATURE OF INVESTIGATOR

Do you wish to receive results of the study?  
\_\_\_\_ yes \_\_\_\_ no

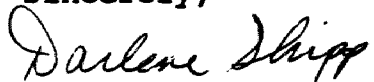
PARTICIPANT FOLLOW-UP LETTER

Dear Participant:

Enclosed you will find the follow-up questionnaire that was identified as part of your agreement to participate in a study to examine the feelings pregnant women have about their unborn babies. Please complete the Prenatal Maternal Attachment Scale by responding to each item according to your feelings **AT THIS TIME**. Then, within five days after you received the questionnaire, return it to me in the preaddressed, stamped envelope provided for your use.

Thank you for the time and input you've given to this study. I appreciate your participation.

Sincerely,

A handwritten signature in cursive script that reads "Darlene Shipp".

Darlene Shipp, R. N.